

Claims

1. A process for the preparation and the deposition of vitreous films on substrates comprising the following steps:
 - 5 - preparation of a solution in an aprotic solvent of one or more alkoxides corresponding to the formula
$$X_m - Me - (OR)_{n-m}$$
where Me is a metal belonging to groups 3°, 4° e 5° of the Periodic System of Elements; m is the valence of Me; X is R₁ or OR₁, with R₁ equal or different from R, m is either zero or integer number equal to or lower than 3; R and R₁ are hydrocarbon radicals with a number of carbon atoms equal to or lower than 12;
 - 10 - hydrolysis of the obtained solution in the presence of a catalyst;
 - 15 - eventual removal of the alcohol formed during the hydrolysis reaction;
 - deposition of the sol on the substrate of interest;
 - final drying and stabilizing of the film.
- 20 2. Stable colloidal solution obtained by hydrolysis, with eventual removal of the alcohol byproduct, of a solution in aprotic solvent of one or more alkoxides responding to the formula reported in claim 1.
- 25 3. Process for the preparation and deposition on substrates of vitreous films according to claim 1 in which the alkoxide is preferably selected among tetramethyl-ortosilane, tetraethylortosilicate, tetrapropylorthosilicate, tetrabutylorthosilicate, ethyltriethoxysilane, methyltrimetoxysilane,30 methyltriethoxysilane, or mixture of the same.

4. Process for the preparation and deposition on substrates of vitreous films according to claim 1 where the aprotic solvent is preferably chosen between acetone, tetrahydrofuran and dioxane.
- 5 5. Process for the preparation and deposition on substrates of vitreous films according to claim 1 where the alkoxide solution or mixture of alkoxides in the aprotic solvent is between 30% and 60% by weight.
6. Process for the preparation and deposition on
10 substrates of vitreous films according to claim 1 where the hydrolysis of the alkoxide is accomplished through addition of a controlled quantity of water.
7. Process for the preparation and deposition on
15 substrates of vitreous films according to the above claim where water is added in such a quantity as to maintain the molar ratio H_2O/Me between 0,5 and 5.
8. Process for the preparation and deposition on
20 substrates of vitreous films according to the above claim where the ratio H_2O/Me is preferably between 1,5 and 4.
9. Process for the preparation and deposition on substrates of vitreous films according to the above claim where the ratio H_2O/Me is preferably between 2 and 3.
- 25 10. Process for the preparation and deposition on substrates of vitreous films according to claim 1 where the hydrolysis of the alkoxide is accomplished in presence of an acid catalyst selected among mineral and organic acids with K_a between 0,1 and 3.
- 30 11. Process for the preparation and deposition on substrates of vitreous films according to the above

claim where the reaction of hydrolysis is preferably made in presence of an aqueous solution of HCl.

12. Process for the preparation and deposition on
substrates of vitreous films according to claim 10
5 where the hydrolysis of the alkoxide is accomplished in
presence of a quantity of acid such to have a molar
ratio alkoxide/acid between 1/0,001 and 1/1.
13. Process for the preparation and deposition on
substrates of vitreous films according to the above
10 claim where the molar ratio between alkoxide and acid
is preferably between 1/0,1 and 1/0,01.
14. Process for the preparation and deposition on
substrates of vitreous films according to claim 1 where
the hydrolysis reaction of the alkoxide solution in
15 aprotic solvent is followed by the removal of the
alcohol byproduct.
15. Process for the preparation and deposition on
substrates of vitreous films according to the above
claim where the removal of the alcohol is preferably
20 made by subjecting the sol to partial and controlled
desolventization.
16. Stable colloidal solution according to claim 2 when
obtained with the process according to one or more of
the claims from 3 to 15.
- 25 17. Process for the preparation and deposition on
substrates of vitreous films according to claim 1 where
the deposition of the film on the substrate of interest
is accomplished through a technique selected among
knife coating, deep coating and spin-coating.
- 30 18. Process for the preparation and deposition on
substrates of vitreous films according to the above

claim where the deposition is preferably accomplished by spin-coating.

19. Process for the preparation and deposition on
substrates of vitreous films according to claim 1 where
5 the final drying is accomplished at a temperature
between 20 and 500°C.

20. Vitreous films obtained and deposited with the process
according to claim 1 characterized in that they have:

- high adhesion to the substrate;
- 10 - final reduction in thickness without cracking;
- good mechanical properties;
- good planarizing properties;
- good optical properties.